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Research Article

Reproductive Biology and The First Record of Egg Dimension of Collared pratincole (*Glareola pratincola*) from Southwest Turkey

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ABSTRACT

This study aims to investigate the breeding biology of Collared pratincole (*Glareola pratincola*), a migratory bird species in Antalya/Boğazkent (Turkey). There are different types of habitat in research area over 200 ha. This feature serves great biodiversity to the area. Field work was carried out from March to October between 2016 and 2017. 35 individuals and 16 nests were found in the first year and 25 individuals and eight nests in the next year. The egg volume has been calculated according to the formulation $V=0.51 \times L \times W^2$ while egg index has been figured with regard to SI=100xW/L formulation. According to the hatchling size, the breeding success of the species was 86.7% in 2016 and 85.7% in 2017.Considering the fledgling size, the figures were 46.4% in 2016 and 66.7% in 2017 respectively. Many factors affecting the breeding success of the species were specified in the region. Hooded crows (*Corvus cornix*), for example, was detected as being the natural predator of the species. Furthermore, the invasion of the breeding areas by humans and human-related activities such as construction, tourism and agriculture also harmfully affect the breeding success. According to our study Antalya/Boğazkent is a very important bird area in Turkey.

Keywords: *Breeding success, Bogazkent, egg index, Glareola pratincola, productivity, Turkey*

Bataklık Kırlangıcı'nın (*Glareola pratincola*) üreme biyolojisi ve yumurta boyutunun Güneybatı Türkiye'den ilk kaydı

ÖZ

Bu çalışmanın amacı Antalya/Boğazkent'te göçmen bir kuş türü olan Bataklık Kırlangıcı (*Glareola pratincola*)'nın üreme biyolojisinin incelenmesidir. Yaklaşık 200 hektarlık araştırma alanında, pek çok farklı habitat tipi vardır. Bu özelliği geniş bir biyoçeşitlilik sunmaktadır. Arazi çalışmaları 2016-2017 yıllarında Mart'tan Ekim'e kadar gerçekleştirilmiştir. İlk yıl alanda 35 birey ve 16 yuva, sonraki yıl ise 25 birey ve 8 yuva bulunmuştur. Yumurta hacmi $V=0.51 \times L \times W^2$ formülüne göre, yumurta indeksi SI=100xW/L formülüne göre hesaplanmıştır. Türün üreme başarısı, açılan yumurta sayısına göre, 2016 yılında %86.7 ve 2017 yılında %85.7, juvenil yavru sayısına göre 2016'da % 46.4, 2017'de % 66.7'dir. Bölge'de türün üreme başarısını etkileyen pek çok faktör tespit edilmiştir. Örneğin, Leş kargası (*Corvus cornix*), türün doğal predatörü olarak belirlenmiştir. Aynı zamanda üreme alanlarının insanlar tarafından işgal edilmesi, yapılaşma, turizm ve tarımsal aktiviteler de üreme başarısını olumsuz yönde etkilemektedir. Çalışmamıza göre Antalya/Boğazkent, Türkiye'deki çok önemli bir kuş alanıdır.

Anahtar Kelimeler: *Üreme Başarısı, Boğazkent, Yumurta indeksi, Glareola pratincole, Üreme, Türkiye*

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I. INTRODUCTION

Collared pratincole is a type of coastal bird of Afro-tropical origin which is also colonial, monogamous and mainly fed as insectivorous [1]. Along the Palearctic, it spreads on the northern coast of Mediterranean and North Africa [1, 2, 3, 4, 5, 6). Very few studies have been done regarding the breeding ecology and behaviour in reproductive populations of the species in Eastern Mediterranean (7, 8). For this reason, species-focused studies addressing Collared pratincole have become important. Being ranked among the "LC" (Least Concern) category according to IUCN (9), Collared pratincole has been evaluated in the category of "VU" (Vulnerable) for Turkey (10). It was involved in the Appx.II according to the Bern Convention (11). Although it can be seen all across Turkey, Collared pratincole has small populations. Boğazkent/Antalya is both a transition region and a breeding ground for this species. Apart from the studies concerned with the spreading parameters or the number of individuals and nests of the species, there is no detailed study in related to reproductive biology in Turkey (8, 12). Therefore, it is not possible to make a comparison between populations of the species in Mediterranean including Turkey in the studies carried out in the North Africa, Spain and France (13, 14, 5, 6). In this study, it is aimed to analyze the reproductive biology of the individuals that are in the field together with the individuals that pass through the region.

II. MATERIALS AND METHODS

This research has been conducted in Belek Special Protection Area in Bogazkent where is located in 45 km east of the Antalya province (36° 50' N, 31° 11' E, approximately at sea level) (Figure 1).

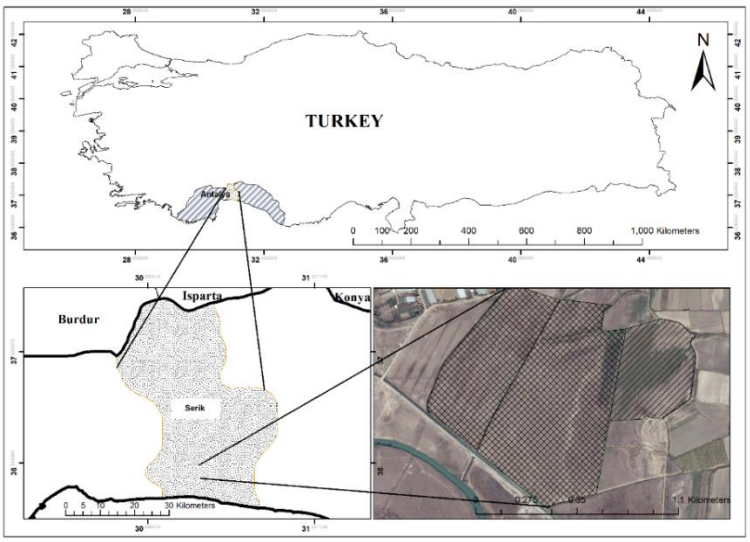

***Figure 1**. Location of study area*

There are numerous different types of habitats, which have been generated by shrubberies, arable lands, marshes, pastures and cultivated areas. Every two years, from March to October, observations have been made as three days a week. In the study, direct observation method (15) has been applied and the nests has been found by following the courting and copulating behaviours and incubating individuals from determined points that have been specified so as not to disturb the birds. In the first year of the study, the number of nests, the number of eggs (clutch size) in the nests and the coordinates of the nests were determined. Collared pratincole incubates with the release of the first egg. The incubation period of the species has been specified by calculating the period of time from the release of the first egg to hatching of the first offspring (16). In the second year, necessary legal permissions were taken in order to be able to carry out the measurements of the nests and data related to width,

height and weight of the eggs were imported. The egg volume has been calculated according to the formulation $V=0.51xLxW^2$, where V is egg volume, L is egg length, W is egg width (17). Egg index has been figured with regard to EI:100 x W / L (18) formulation, where SI is Sphericity index, L is egg length, W is egg width. To import this data, callipers and precision scales have been used. Besides the individuals settling in the area for breeding every two years, the number of individuals using the region as a transition zone was also monitored.

III. RESULTS

Most of the Collared pratincoles that have been observed in Boğazkent use the area for transition. Few of these individuals settle in the area for inhabiting and breeding. The first transits on Boğazkent/Antalya were on 24 April for 2016 and 22 April for 2017 (Figure 2).

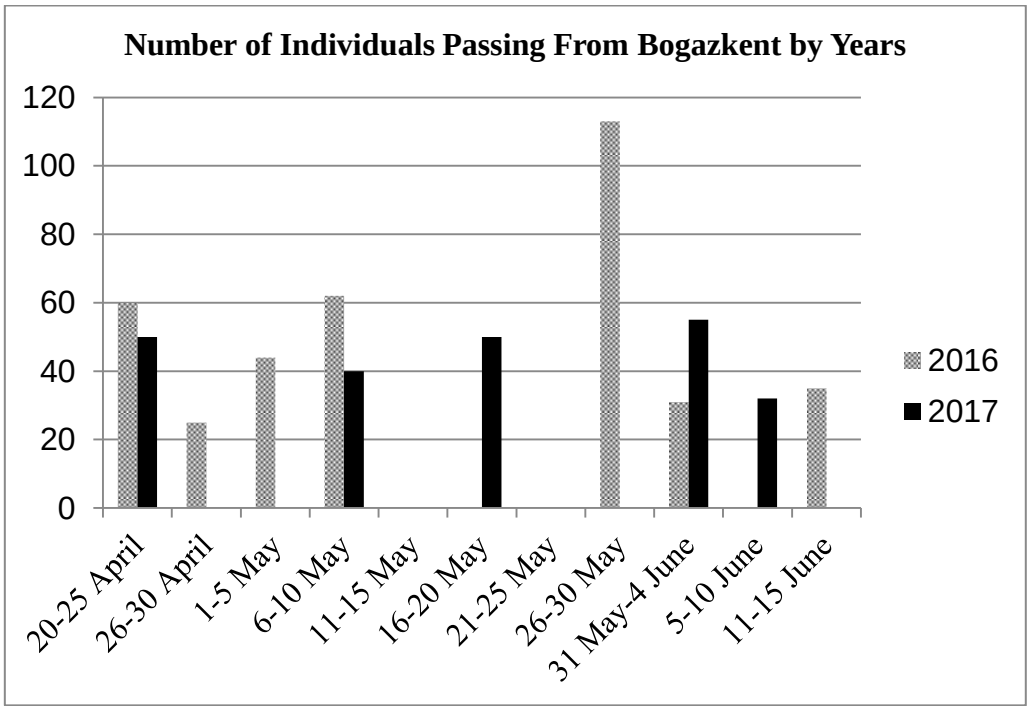

Figure 2. *Number of Individuals Passing From Bogazkent by Years*

The 35 individuals in 2016 and 25 in 2017 breed in the area. 16 nests belonging to these individuals were found in 1, 2 and 3 clusters with an average clutch size of 1.88 and a total number of 30 eggs left in 2016. In 2017, 8 nests were found in 1 and 2 clusters with an average clutch size of 1.75 and a total of 14 eggs left (Table 1, Table 2). The incubation period was calculated as 17 days in 2016 while 16 days in 2017. In the period after the incubation, hatching was observed in 13 out of 16 nests during the breeding season of 2016 while no egg hatched in 2 nests and 1 nest was exposed to predation. When all the eggs were evaluated, hatching was observed in 26 out of 30 eggs. In 2017, the next breeding period, no egg hatched in 1 nest while hatching occurred 6 out of 8 nests.

Table 1. *Population Traits of Boğazkent/Antalya*

Population Traits	Years	
	2016	2017
Individuals	35	25
Nest	16	8
Eggs	30	14
Hatchlings	26	12
Fledglings	12	8
Hatchling Ratio	86.7%	85.7%
Fledgling Ratio	46.4%	66.7%

Table 2. *Egg Traits of Collared pratincoles in Antalya/Boğazkent*

	Egg Traits					
	N	**Width (mm)**	**Length (mm)**	**Weight (g)**	**Egg Volume (cm^3-cc)**	**Egg Index (%)**
Min.	14	23.16	28.39	8.7	8.04	74.5
Max.	14	25.61	32.08	11.2	10.57	83.6
Mean±Sd.	14	24.21±0.70	30.69±0.92	9.67±0.64	9.19±0.67	74.8±2.81

The nestlings of Collared pratincoles are in precocial type. As they feed on their own in parental control after leaving the eggs, this period has a higher risk in terms of predations and more losses. This is particularly the case for the nests with a large number of eggs. By tracking the nestlings in both periods, it has been detected that 12 out of 26 nestlings that left the eggs in 2016 grew in maturity of flying and 44 individuals were in the region during the period before migration. In 2017, the next breeding season, observations showed that 8 out of 12 nestlings that hatched grew in maturity of flying and 33 individuals were in the region during the period before migration. Data regarding the population has been given in Table 1. At the end of the breeding season, the individuals returned to the wintering grounds in August 2016. In 2017, the individuals began to leave the area in July and last individuals left Boğazkent in September.

IV. DISCUSSION & CONCLUSION

Boğazkent is home to many native and immigrant species as well as a transition zone or an accommodation area for some species (19). During the spring migration carried out from Africa to Northern regions, a large part of the population uses Boğazkent as a transition zone while few individuals settle in the area to perform breeding activities. Therefore, the area is important as being a transit zone and in a position of enabling reproductive activities. When the other populations of Collared pratincole are examined, it can be seen that the arrival dates have been reported as the first half of March for Morocco (5) the end of march for Algeria (6), the end of march and the beginning of april for Spain (13, 20) and the first half of april for France (14). Egg-laying periods have been stated as the first half of april for Morocco (5), the end of april for Algeria (6), the first half of may for France and the second half of may for Spain. Although the breeding activities of this species have been reported in Greece (7), Western Turkey (8), Russia (21) and Hungary (22), no information has been given regarding their arrival dates. In a study conducted by (12) in Boğazkent, the arrival time to the area was stated as the end of april. In our study, the time of arrival to the area has been specified as the end of april and egg-laying period has been determined as the end of may and the beginning of june. Compared to other populations, it is observed that both arrival dates and egg-laying times are the latest. In respect to clutch sizes, it was reported that figures were 2.3±0.7 (5) for the population of Morocco, 2.5±0.7 (14) for France and 2.6 (13) for Spain. (5) stated that the populations of Algeria had

smaller clutch sizes than the other two populations in Mediterranean. On the other hand, the clutch sizes for Algeria have been reported as 2.0±0.7 by (6). The figure has been determined as 1.88 in 2016 (23) and 1.75 in 2017 for the population of Boğazkent. In other populations, it has been stated that 1 to 3 eggs were left in the nests (5). In Boğazkent, 1 to 3 eggs in 2016 (23) and only 1 or 2 eggs in 2017 were left in the nests. Clutch size seems to have the smallest value in Boğazkent. Egg laying period was indicated as 45 days by (5) and 36 days by (6). For Boğazkent, this period is around 50 days. In different studies, it is reported that Collared pratincoles make its nests near the nests of different bird species (5, 6, 24). Calvo and Furness (1995) emphasized that the nests were interestingly made close to the nests of Lapwings *Vanellus vanellus* (24). (5) reported that Collared pratincole shares its nesting site with Kentish plover *Charadrius alexandrinus* and Little tern *Sterna albifrons* in rocky habitats and with Eurasian Thick-knee *Burhinus oedicnemus* and Crested Lark *Galerida cristata* in dune areas. It was detected that the nests of Collared pratincole in Boğazkent were close to the nests of Spur-winged lapwing *Vanellus spinosus* (25), another coastal bird with an important breeding population in the region. Especially for the birds nesting on the ground, it has been thought that nesting close to the nests of other species that nest on the ground can be a defense strategy against predators. Being a coastal settlement, Boğazkent is a very important area in terms of biodiversity and birds as it has numerous different types of habitats, generated by shrubberies, arable lands, marshes, pastures, wetlands and cultivated areas. It is also a tourism region and local people make their living from agriculture and stockbreeding. This causes a dense structuring in the region and the conversion of many areas into fields. Narrowing natural habitats, i.e. the loss of habitat negatively affects bird species (26). Nesting on the ground such as coastal birds. (24) reported that the nests were made in marsh and arable areas. It has been stated by Kiss et al. (2017) that Collared pratincole is a type of bird that breeds in meadows in Hungary but recently, it nests in agricultural areas as well (22) . (5) reported that the nests of Collared pratincole were made in rocky and dune areas and the intensive conversion of marshes and meadows into modern agricultural areas became a serious threat for such species. In Boğazkent, there is small number of Collared pratincole and they make their nests only in pastures. Areas previously used as pasture area have been identified as cultivated zones in 2017. There are two pastures left for the breeding of this species. The destruction of these areas is one of the negative factors that prevent the breeding of this species in Boğazkent. On the other hand, possessed and stray dogs together with Hooded crows *Corvus cornix* are the main natural predators. Although Collared pratincole is a species observed all across Turkey, the breeding populations is not very crowded in terms of the number of individuals. For this reason, receiving 16 nests in one season shows that Boğazkent has an important breeding ground potential. On the other hand, 8 nests were found in 2017. This figure represents the half of the number of nests found in the previous year. This suggests that even though Boğazkent is an important area for birds, existing or possible negative factors have adverse effects on avifauna.

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